Unname -a command to check ver of
unix.

The code will not run on 64-bit machine.

Pages

PROT_NONE

PROT_ALL

heap

stack

{ homework.c

\( \leq N \) (for question: limit the number

of pages in memory.)

\[ \rightarrow \]

\[ \rightarrow \]

fault

\[ \rightarrow \]

Change

Permission

\[ \rightarrow \]

Only changing the protection

\[ \rightarrow \]

No need to change memory mapping

\[ \rightarrow \]

No need to read or write the page

\[ \rightarrow \]

No need to use unmap or anything like this.

\[ \rightarrow \]

Just replace the page which faulted longest ago

when number of pages reach to \( N \).
VMS LRU approx

When fault occurs for a page in reserved steps taken 1) & 2). Page in moved to active and last page from active is moved to reserved.

When fault occurs for a page in disk it is taken to active & 1) and last page from active is moved to reserved 2) . Finally a page from reserved is moved from reserved 3) to disk 3).

The order is reverse i.e. 3) to 2) to 1) to make place for a page before new comes in at any media.
Question 2

This is to simulate the VMS LRU approx.

Question 3 day
file with sector number.

5 → read block 5

1000
101
102
1000
10000
how long will it take to reach the position from where we currently are.

1) Seek time
   Current radial position
   \( \rightarrow \text{new} \)
   \( \rightarrow \text{update angular position} \)

2) Rotation to beginning of the block.

\( \rightarrow \text{just need to keep track of small amount of state and time taken.} \)

\( \rightarrow \text{ignore the block number higher than 1619} \)
Volume Managers

- Size
- Performance
- Reliability
- Flexibility

- Increasing the size of existing file system by adding extra disc

→ Concatenation

→ This gives ability to grow your volume

→ This is somewhat like virtual memory

→ Doing this a lot of times will make it cluttered and need to migrate to a new system or backup.
Migration

writes

reads

old

new

- Can't shutdown and copy because that will include a long pause.
- Can't directly copy while system is running because old one is updating continuously and by the time we finish copying the new will become out of date.

These are two approaches to do this.

- First one depends on a fact that only a small part is updated during a time.
According to first approach it copies a block from old to new and also keeps a track of updates in a map. After copying it blocks the write for a while and update the 'new' volume by looking at the map.

In second approach we just block the write request for a while and copy.
Volume management for virtualization.

A file on disk looks like an actual disk to virtual machine.

**Asynchronous Replication**

You can't just mirror because in a real-time transaction will take a lot of time and performance will be affected.

Packaging of all the write and reading. Also, make sure that the order of writes is the same.
the backup disk is not consistent in consistent with the local one but it is consistent with an earlier state of the local disk.

The backup disk isn't intended to be a perfect mirror of original disk.

SAN storage area network

SCSI Read/write parallel SCSI
- USB
- Serial SCSI (SAS)
- Fiber Channel
- iSCSI (SCSI over TCP)

LUN logic unit number

just like a TCP port to specify a certain client and point.